

Radiation Safety Information Computational Center (RSICC)

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Presented to NCSP Technical Review

ORNL is managed by UT-Battelle, LLC for the US Department of Energy



U.S. DEPARTMENT OF
ENERGY

Radiation Safety Information Computational Center (RSICC)

Mission:

Serve as a unique nuclear software and data center for government agencies, universities and private industry by providing a centralized resource for quality-controlled modeling and simulation tools, processed nuclear data, and evaluated experimental benchmarks

Strategy:

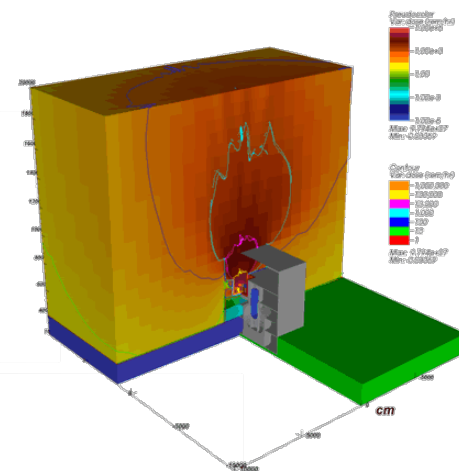
Engage domestic and international efforts that develop advanced M&S tools, evaluated nuclear data and benchmark experiments to make them available to our customers

Statistics:

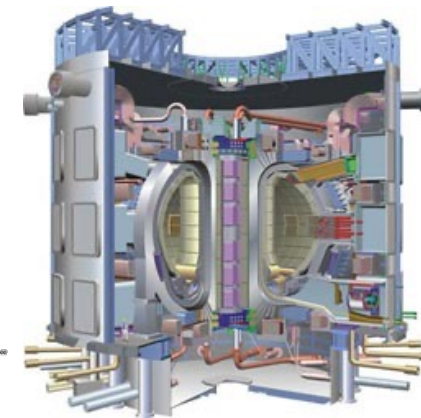
Over 2,000 packages in the RSICC collection
Nearly 4,000 packages distributed annually
15,000+ active customers from 100+ countries
Operate secure CLOUD server to support international collaborations, e.g., ITER

Major sponsors:

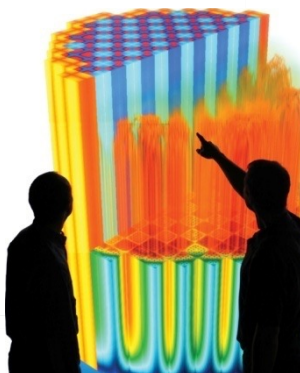
NNSA Nuclear Criticality Safety Program, NNSA Non-Proliferation R&D, DOE Office of Nuclear Energy, Nuclear Regulatory Commission, NNSA Naval Reactors, DOE Office of Science



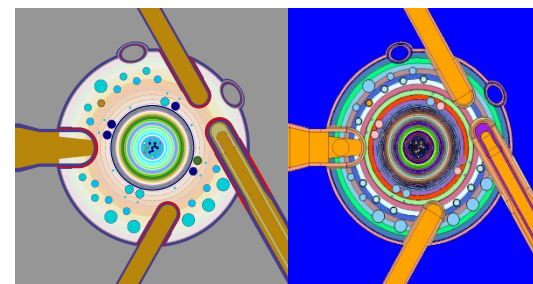
Radiation Source Terms



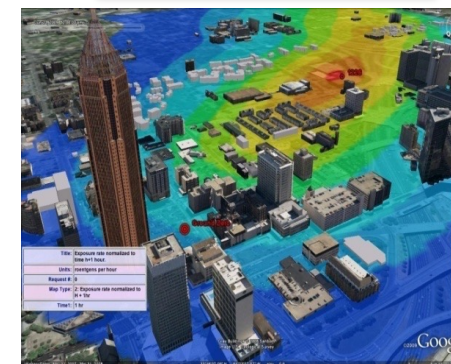
Fusion



Advanced Reactors



Nuclear Criticality Safety



Nuclear Security Modeling

RSICC is a specialized information analysis center that collects and disseminates software and data for applications in nuclear science and technology

- RSICC's operations include various activities
 - Software Packaging and Quality Assurance
 - Customer Registration
 - Customer Request Processing
 - Website Maintenance and Updates
 - Software Exchanges with International Organizations
 - Production of monthly Newsletter
 - *Secure CLOUD operations*
- Records retention is a key aspect of RSICC's operations to allow the Federal government to monitor the use of U.S. nuclear technology



RSICC's distribution of nuclear M&S tools falls under the regulation of the U.S. Federal Government

- **Department of Commerce: Bureau of Industry and Security (BIS)**
 - 15 CFR Parts 730-774
- **Department of Energy**
 - 10 CFR 810 (basis Atomic Energy Act of 1954)
- Nuclear Regulatory Commission
 - Nuclear reactors, equipment, components and materials
 - 10 CFR 110
- Department of State: Directorate of Defense Trade Controls (DDTC)
 - International Traffic in Arms Regulations (ITAR)
 - Military items including nuclear weapons
 - 22 CFR Parts 120-130
- Department of Treasury: Office of Foreign Assets Control (OFAC)
- MCNP® regulated by 10 CFR 810 whereas SCALE is regulated under DOC
- Citizenship(s) of the end user determines export regime and approval process for all requests

Single User License Agreement

- Single User License Agreement
 - Restricts software to only be used by the Licensee
 - Restricts Licensee from redistributing the software or variants of the software to others
 - License is only valid while the individual is associated with the organization identified on the license agreement and for the approved end use
 - *Some end uses are not permissible under U.S. Federal regulations*
 - Licenses have always been linked with the customer's organization, location and end use – whether implicit, prior to Feb. 2015, or explicit, after Feb. 2015
 - RSICC is required to screen all organizations against denied parties list maintained by the Federal government to ensure compliance with U.S. export control regulations by the DOC, DOE, DOT, etc.
 - RSICC is required to review all end uses as not all end uses are permissible even if individuals are physically located and working in the U.S.
 - Prior licensing records have been utilized in several U.S. Federal government investigations of RSICC's customers including those by the DOE Inspector General, the FBI and the U.S. Attorney General's Office

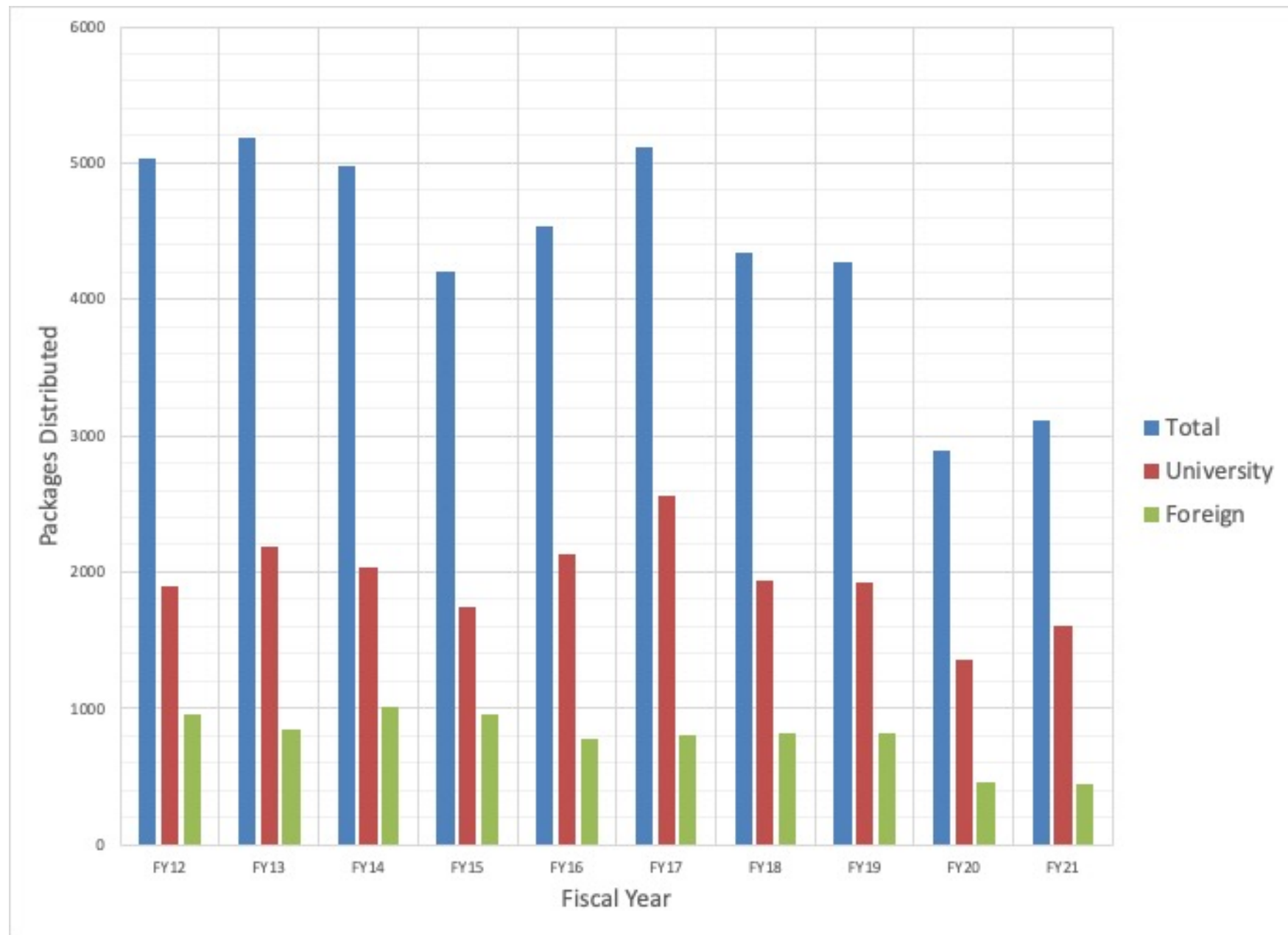
Export Control Agreements

- Export Control Agreement

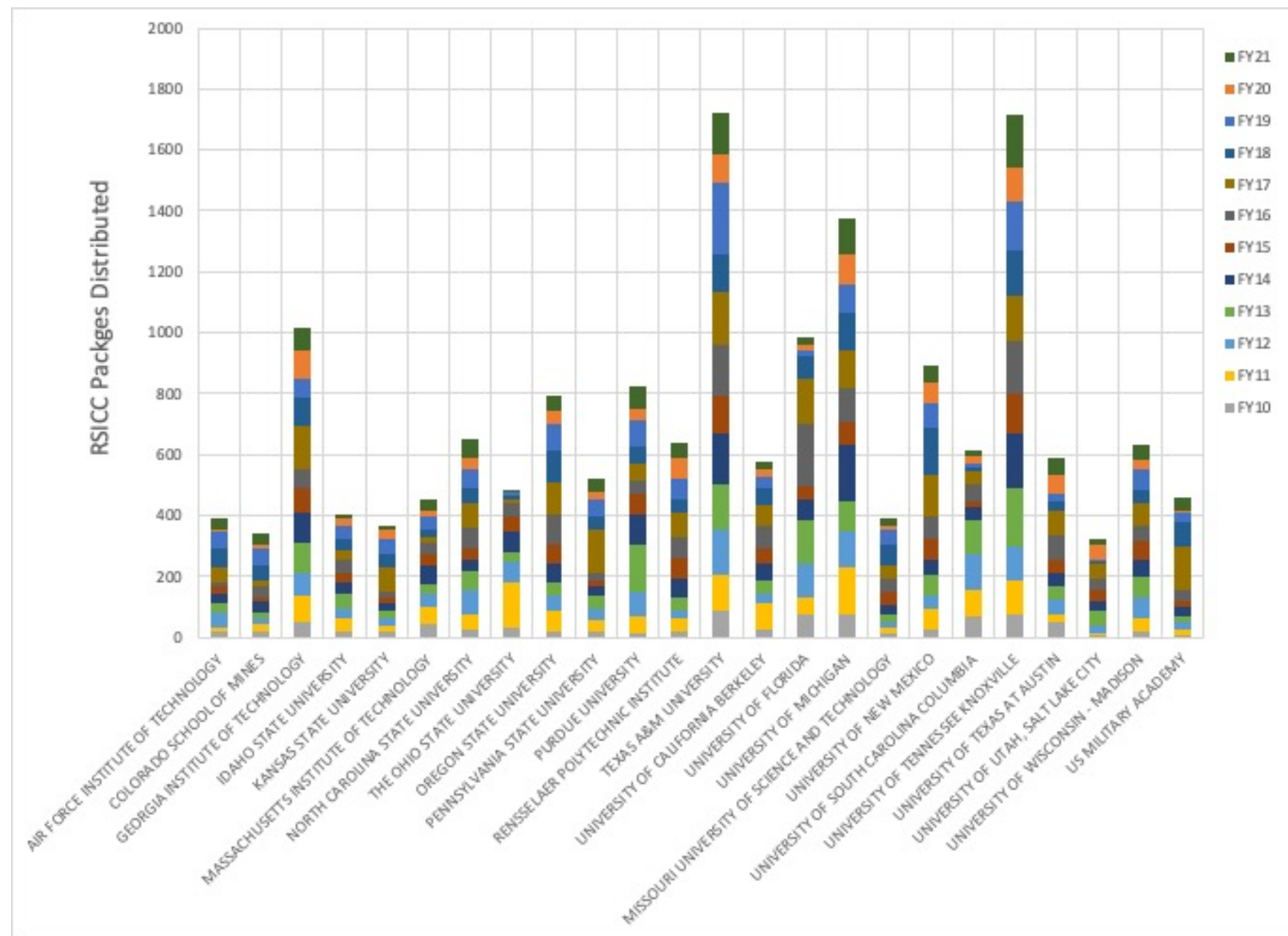
- Restricts re-export of the software to other locations
- Restricts use of the software for military or defense purposes unless authorized and approved by the U.S. Government for persons physically located in the U.S.
- Requires the Licensee to assert that they are not identified on a denied persons' lists or a citizen of a country identified on a parties' lists
- Identifies the export control jurisdictions for the software
- Not all end uses are permissible even if the individual is in the U.S. and working for a U.S. organization per U.S. Code of Federal regulations (10 CFR 810)
 - A specific authorization by the U.S. Secretary of Energy is required for engaging in or providing technology for activities listed in 10 CFR 810 (810.7(C)) to foreign persons.
 - Uranium isotope separation (enrichment), plutonium isotope separation, etc.
 - Fabrication of nuclear fuel containing plutonium
 - Heavy water production
 - Development, production or use of a “production” accelerator-driven subcritical assembly (an accelerator driven system for production of weapons grade materials)
 - Development, production or use of a “production” reactor
 - Reprocessing of irradiated nuclear fuel or targets containing special nuclear material

RSICC's customers and software distribution

Decrease in
RSICC's
Distributions
in FY20 due
to COVID

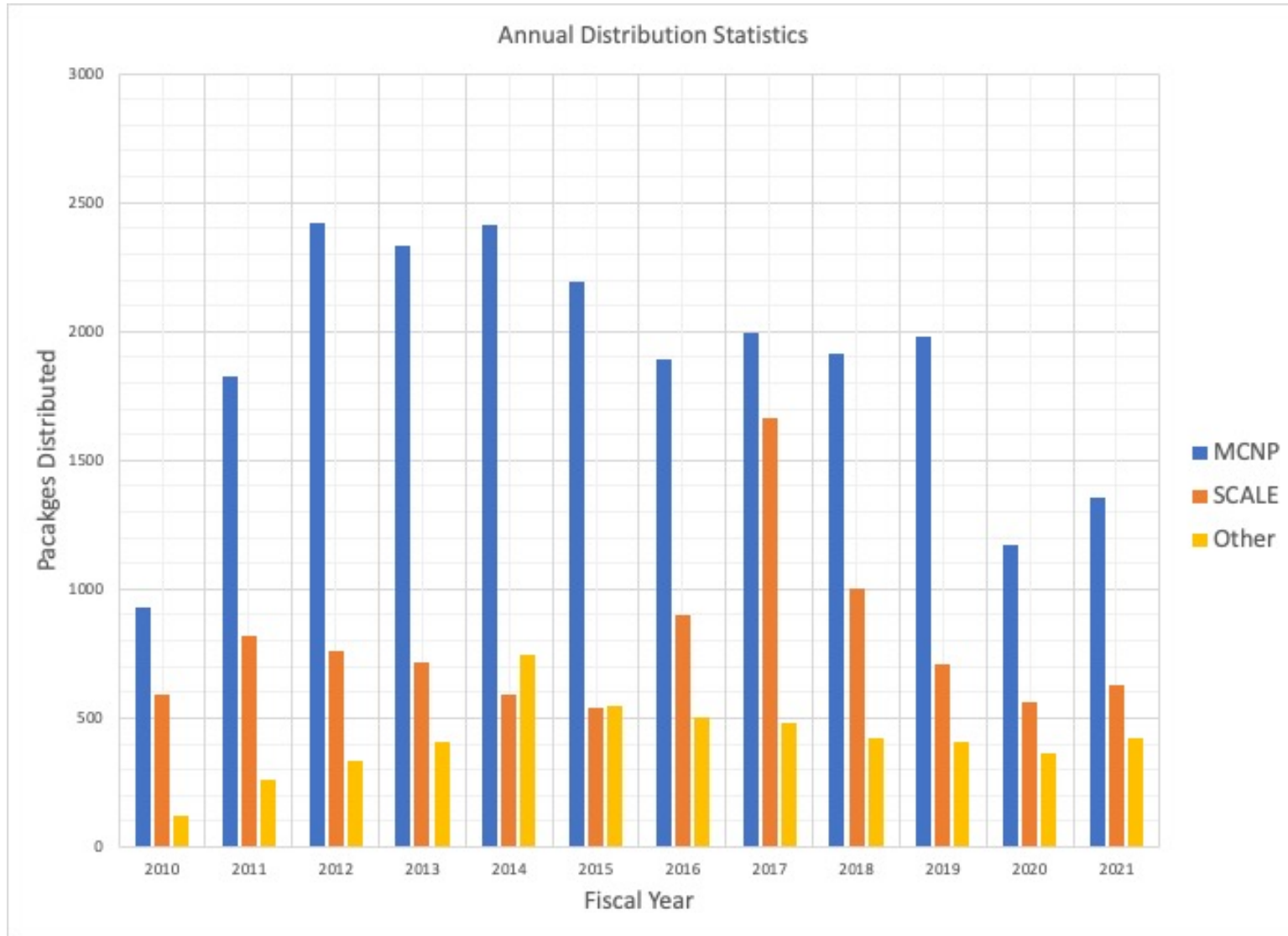


RSICC Distributions to Top Universities in FY2020



266 universities have obtained software from RSICC

RSICC's Most Demanded Software Packages



- Increase in software demand corresponds to:
 - Growth in enrollments in nuclear engineering departments and their greater dependence on modeling and simulation tools
 - Releases of new versions of codes
- Growing demand for SERPENT that is only available for research purposes and ADVANTG

RSICC's Commonly Requested Software Packages

MCNP and SCALE are most in-demand packages

Fiscal Year	MCNP	SCALE	ADVANTG	SERPENT	VESTA	SWORD	PENELOPE	RELAP	SAPPHIRE	VARSKIN	RASCAL
2010	931	588	0	27	0	22	20	20	0	27	0
2011	1828	818	0	34	1	60	23	15	0	118	5
2012	2422	760	0	47	12	43	43	27	0	138	25
2013	2333	713	0	98	21	28	19	62	0	115	65
2014	2413	589	0	104	15	35	18	42	53	113	361
2015	2196	540	53	117	8	26	23	35	113	48	124
2016	1888	901	101	131	6	34	26	16	115	38	35
2017	1991	1663	64	169	3	30	23	22	97	30	32
2018	1917	1001	67	138	5	17	19	19	113	17	31
2019	1981	712	89	136	4	29	14	9	84	25	17
2020	1174	564	107	134	3	10	6	4	62	11	24
2021	1354	626	118	161	5	10	4	10	82	8	21

RSICC's Operations Summary

- Rigorous process for processing requests and approvals
- Records retention and management that meet needs of the Federal government
 - Records have been solicited for civil and criminal prosecutions
- Quarterly Distribution of NCSP Supported Software
 - Q1: 291 MCNP®, 127 SCALE, and 0 COG
 - Q2: 366 MCNP®, 142 SCALE, and 1 COG
 - Q3: 260 MCNP®, 128 SCALE, and 0 COG
 - Q4: 426 MCNP®, 234 SCALE, and 0 COG
- FY2021 Packages Distributed
 - Total: 3,106
 - University: 1603